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ABSTRACT

Nearly 15,000 Wisconsin public school students in grades 4, 8, and 12 were tested in Spring, 1977, as part of the Wisconsin Pupil Assessment Program. Objectives were: (1) to measure student progress in attaining specific mathematics objectives; (2) to determine how students compared nationally in reading, language, and mathematics; and (3) to determine changes in performance compared to 1976 test results. Both criterion referenced tests and national , standardized, norm referenced test were administered. An overview of the findings indicated students performed better in computation problems than in story problems; students scored above the national average in reading, language, and mathematics; twelfth graders performed better than eighth graders in the mathematics tests; the 1977 performance showed improvement when compared to the 1976 test results; females scored better than males in reading and language arts; and male and female test scores in mathematics were nearly the same. (The report is divided as follows: results of criterion referenced tests; results of the Comprehensive Tests of Basic Skills; comparison of eighth and twelfth graders on the mathematics criterion referenced test; comparison of 1976 and 1977 results; and comparison of male and female test results). (MH)

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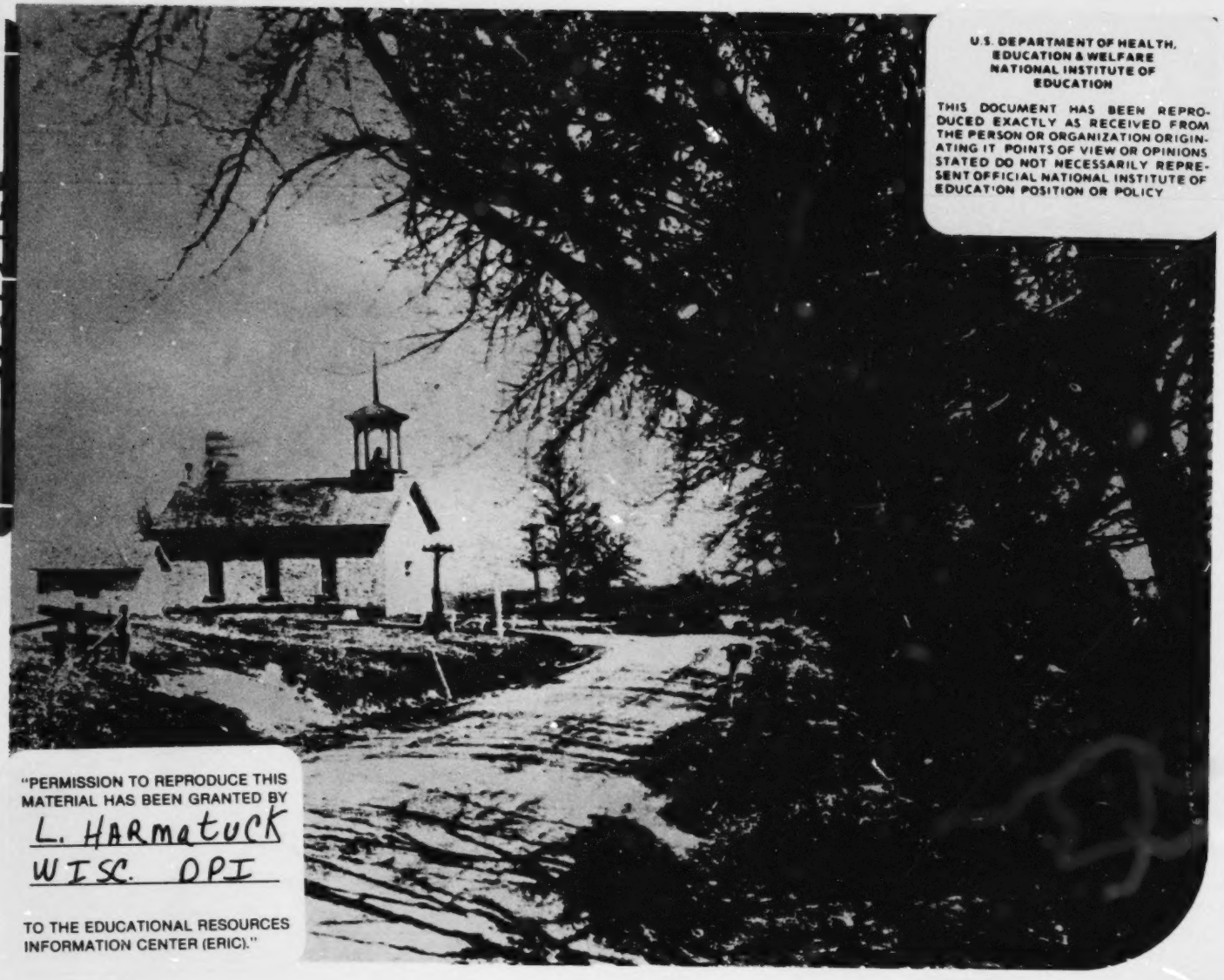

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WISCONSIN PUPIL ASSESSMENT PROGRAM

REPORT: SPRING 1977

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PREFACE

This report is part of the continuing effort by the Department of Public Instruction to provide the people of Wisconsin with a profile of how well students in the public schools perform important academic skills.

Test results are provided by the Wisconsin Pupil Assessment Program to accomplish four major goals:

- -To provide the legislature, governor's office, and general citizenry of Wisconsin with a profile of how well a sample of Wisconsin public school students demonstrate expected skills and knowledge.

- -To provide the legislature, governor's office, and general citizenry of Wisconsin with a profile of how well a sample of Wisconsin public school students perform in comparison to the rest of the nation.

- -To provide the legislature, governor's office, and general citizenry of Wisconsin with periodic progress reports that indicate systematic upward or downward trends in performance.

- -To provide materials and technical assistance to local school districts who voluntarily utilize the products and processes of the State Pupil Assessment Program.

A systematic statewide assessment with specific goals is essential if we are to truly understand the general status of educational achievement in Wisconsin. Test results alleviate the problem of having to draw conclusions based solely on limited personal or anecdotal experiences.

Although the assessment program eventually will cover all the basic skills, along with other important areas, the 1977 program specifically assessed reading, language, and mathematics. Each of these areas was assessed on a national standardized norm-referenced test at grades four, eight, and twelve. In addition, a more detailed objective-referenced mathematics test was administered at the same grade levels.

Results of the 1977 Spring Assessment indicate that Wisconsin public school children perform as well as their peers across the nation. Mathematics is an especially strong area: students have the ability to do basic computation and also apply this ability to many practical problems encountered in everyday living. Close scrutiny of the data described in this report shows some areas of weakness. However, the overall results are positive and encouraging in light of some of the downward trends in performance reported by the national media.

A note of caution is warranted. The tests used are all multiple choice and reflect only a portion of the school curriculum. No attempt has been made to test the upper limits of pupil ability or such important characteristics as creativity. Despite these limitations, the results provide a profile of how well Wisconsin students are able to perform some very basic and important skills.

INTRODUCTION

In the spring of 1977 a statewide sample of nearly 15,000 public school students in Wisconsin participated in the Wisconsin Pupil Assessment Program. The objectives of the assessment were:

- -To determine how well students can do problems related to specific mathematics objectives.
- -To determine how they compare nationally in mathematics, reading, and language.
- -To determine any significant increases or decreases in performance as compared to the 1976 test results.

To accomplish the first goal, Wisconsin educators identified a set of objectives students would be expected to achieve at the fourth, eighth, and twelfth grades. Test items were developed to measure each objective.

Fourth graders were tested in six mathematics domains; eighth and twelfth grade students were tested in seven domains. The various test domains are shown in Table 1.

Nearly 15,000 students were tested. The numbers of students taking each test form are indicated in Appendix A. Appendix B lists the mathematics objectives. A Mathematics Technical Report is available from the Department of Public Instruction for those who want more detailed information.

Table 1

DOMAINS ON OBJECTIVE-REFERENCED TESTS

Fourth Grade	Eighth and Twelfth Grades
Computation	Computation
Addition	Addition
Subtraction	Subtraction
Multiplication	Multiplication
Division	Division
	Proportion & Percent
Applications	Applications
Money Application	Money Application
Measurement	Measurement

The second goal of the Assessment Program is to determine how Wisconsin students compare with fourth, eighth, and twelfth graders nationally in mathematics, reading, and language. To accomplish this goal, the Comprehensive Tests of Basic Skills (CTBS) was given to approximately 5,000 students. This test is produced by CTB McGraw-Hill and is specifically designed to compare individuals or groups with a national average.

A third goal of the Assessment Program is to gather information over a period of years so that time-based increases or decreases in performance can be detected. In 1976 similar tests were given to random samples of fourth, eighth, and twelfth grade students. Section IV compares the 1976 and Spring 1977 results.

In order to identify valid and reliable long range trends in performance, it is necessary to collect common data over a three to five year period. Slight variation in performance scores is to be expected from one year to the next even if students have the same abilities. This is a result of the peculiarities of sampling. Consequently, the trends identified in Section IV must be considered tentative and await verification over the next few years.

This report is divided into several sections:

Section I -Results of the Objective-Referenced Tests

Section II -Results of the Comprehensive Tests of Basic Skills

Section III -Comparison of Eighth and Twelfth Grade Students on the Objective-Referenced Mathematics Test.

Section IV -Comparison of Results on the 1976 and Spring 1977 Assessments.

Section V -Comparison of Male and Female Performance on the Objective-Referenced Mathematics Test And Comprehensive Tests of Basic Skills.

OVERVIEW OF FINDINGS

1. Fourth, eighth, and twelfth grade students do best in computation problems (addition, subtraction, multiplication, and division). Application or "story" problems give students more difficulty.

2. Wisconsin fourth, eighth, and twelfth graders score above the national averages in reading, language, and mathematics.

3. Seniors perform better than eighth grade students on all domains of the objective-referenced mathematics test. The greatest differences are in proportion & percent and in the money and measurement application problems.

4. Generally, there is improvement in student performances between 1976 and Spring 1977. However, a longer period of time is needed to verify this improved performance.

5. Comparisons between males and females on the Spring 1977 assessment indicate a stronger performance by females in reading and language skills. Scores in mathematics are nearly the same.

   Among high school seniors, males and females score at the same percentile in reading (55th), whereas females score 12 percentile points above the males in language skills. The differences in mathematics are very small on the objective-referenced test. On the Comprehensive Tests of Basic Skills males score three percentile points above the females.

SECTION 1

Results of Objective - Referenced Tests

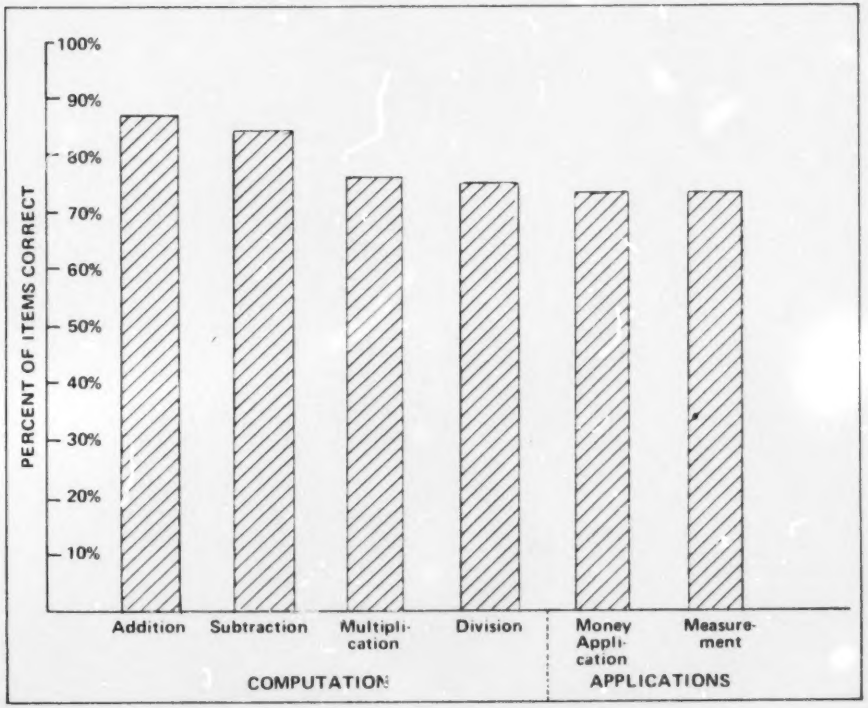
FOURTH GRADE

Fourth grade students do best in the four computation domains: addition, subtraction, multiplication, and division. The highest computation scores are in addition (87% correct), while the lowest are in division (75% correct).

Within the computation domains certain tasks prove troublesome. Students have some difficulty in subtraction problems involving zeroes and in those cases in which regrouping ("borrowing") is required. Multiplication with two-digit multipliers also represents an area of weakness.

Scores in the two applications domains are somewhat lower than the average for all computation domains. In money and measurement applications, in which students must read a problem and then apply computation skills, scores are 73 percent correct for each domain.

Figure 1
Percent of Items Correct in Mathematics: Grade 4



EIGHTH GRADE

In the computation domains eighth grade students do well in addition, subtraction, and multiplication of whole numbers and decimals. Within these three domains students average 90 percent correct or greater in whole number calculations. Operations on fractions, especially addition, give students more trouble.

Division and proportion & percent are areas of weaker performance. In each case eighth graders average about 70 percent correct.

Scores in the two application domains, money and measurement, are lowest. The scores average 65 and 68 percent correct, respectively.

Figure 2
Percent of Items Correct in Computation: Grade 8

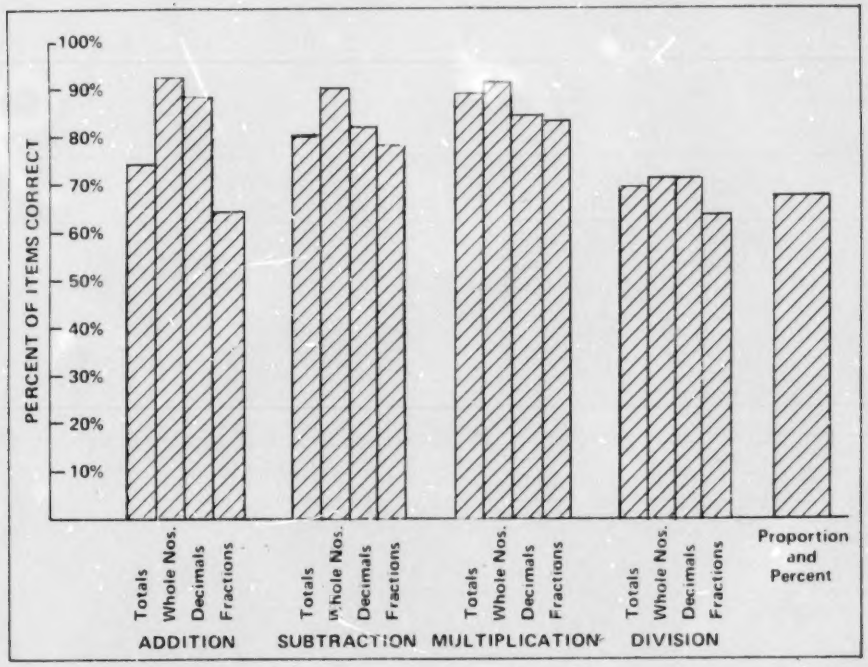
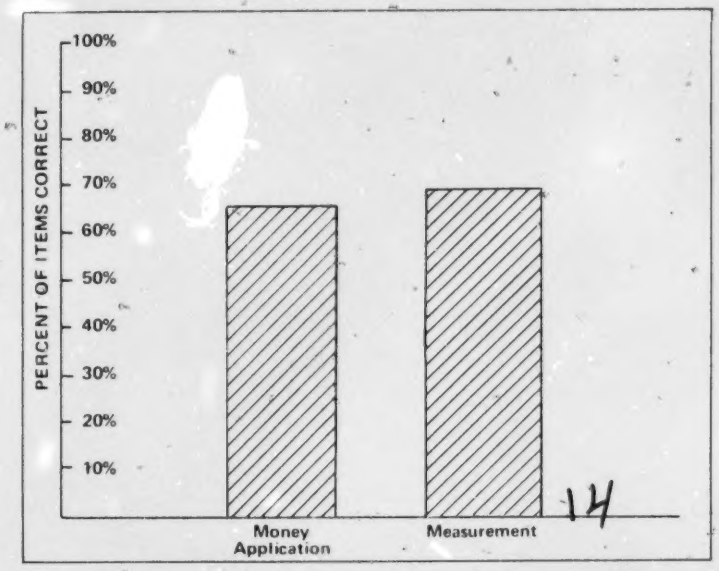


Figure 3
Percent of Items Correct in Application: Grade 8



TWELFTH GRADE

In addition, subtraction, and multiplication of whole numbers, twelfth grade students average over 90 percent correct. As is the case with eighth grade students, scores in division and proportion & percent are lower.

Twelfth grade students show a high level of performance in the two application domains: money and measurement. In each instance the scores are above 80 percent correct.

Figure 4
Percent of Items Correct in Computation: Grade 12

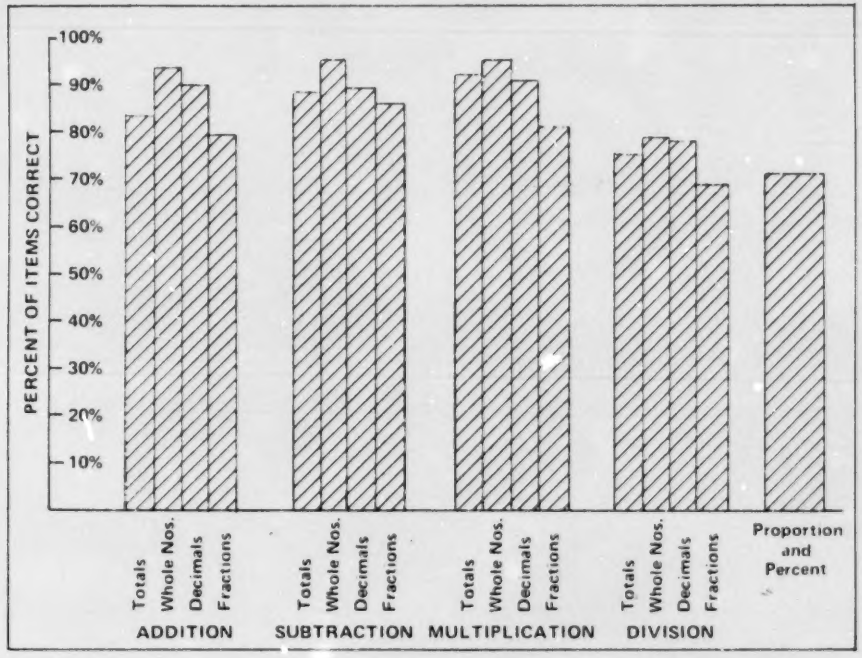
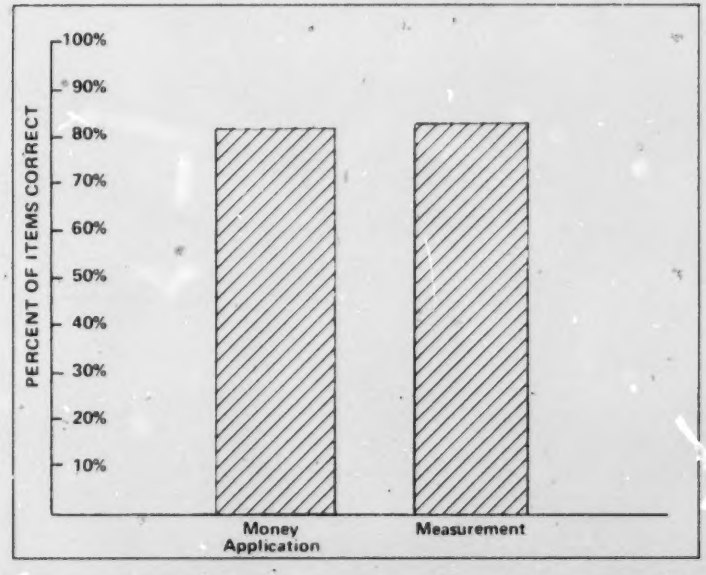


Figure 5
Percent of Items Correct in Applications: Grade 12



SECTION II

Results of the Comprehensive Tests of Basic Skills

The test instrument used to compare Wisconsin students with a national norm group is the Comprehensive Tests of Basic Skills (CTBS). Wisconsin students were tested in three subject areas: mathematics, reading, and language.

The national percentile scores of the CTBS serve as the basis for comparison. National percentile scores indicate how well the average Wisconsin student performs in relation to students of a similar grade across the country.

Percentile scores range from 1 to 99. A percentile score of 75, for example, means that 75 percent of the national norm group scored lower on this test than the average Wisconsin student. It does not mean that the student answered 75 percent of the questions correctly.

In addition to presenting the average percentile scores, another method also is used to compare Wisconsin fourth, eighth, and twelfth grade students with national averages. Percentile scores are classified into three categories: upper, middle, and lower. Nationally, 25 percent of all students score in the upper category, and 25 in the lower category; 50 percent score in the middle category. The percentage of Wisconsin students falling in the various percentile categories is presented for each grade level. This method of comparing Wisconsin students to the national norm group allows some conclusions to be reached about the distribution pattern of Wisconsin students at the three grade levels.

FOURTH GRADE

Wisconsin fourth graders compare very favorably with fourth grade students throughout the country in reading, language, and mathematics. As indicated in Figure 6, fourth graders score at the 70th percentile in reading, the 64th percentile in language, and the 71st percentile in mathematics.

The battery total for the three subject areas indicates that the average Wisconsin fourth grade student scores higher than two-thirds of all fourth graders in the national norm group.

The distribution of Wisconsin students within the three percentile categories (Table 2) also exemplifies strong performance. For example, in reading 43 percent of Wisconsin fourth graders place in the upper range. This is 18 percent more than is found nationally. Only 15 percent fall into the lower range. This is 10 percent less than is found nationally.

Figure 6
Mean Percentile Scores of Wisconsin Fourth Grade Students Versus National Average

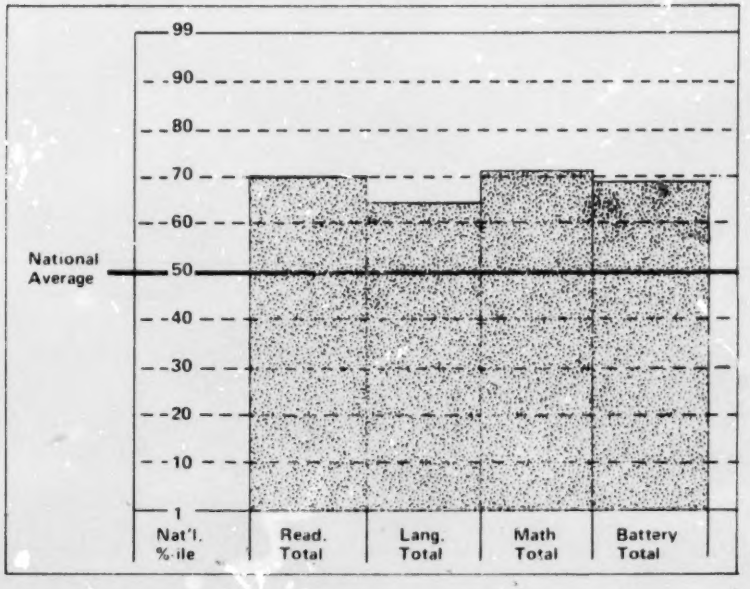


Table 2
Comparison of Wisconsin Fourth Grade Students With National Norms: Mathematics, Reading, and Language

Percentile Range	National % of Students	Percent of Wisc. Students Falling in %-ile Range Read.	Lang.	Math.	Total
Upper (76-99)	25	43	36	44	40
Middle (26-75)	50	42	48	41	47
Lower (1-25)	25	15	16	15	13
Totals	100%	100%	100%	100%	100%

EIGHTH GRADE

Like fourth grade students, eighth graders in Wisconsin compare favorably with the national averages. Their best performance is in mathematics, where the average eighth grader scores better than nearly three-quarters of the national norm group.

In reading and language the scores also are strong, falling at the 65th and 62nd percentiles, respectively.

Table 3 further points out the high performance level. Over one-third (39%) of Wisconsin eighth graders score in the upper range, while only 10 percent score in the lower range.

Figure 7
Mean Percentile Scores of Wisconsin Eighth Grade Students Versus National Average

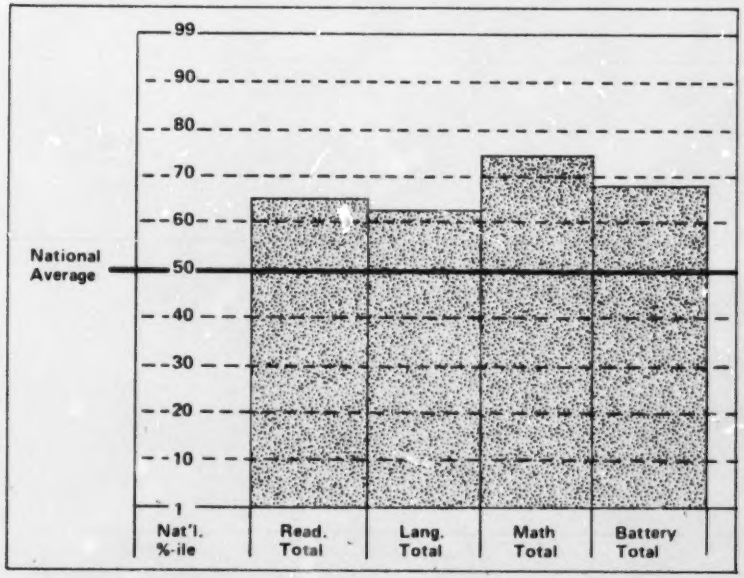


Table 3
Comparison of Wisconsin Eighth Grade Students With National Norms: Mathematics, Reading, and Language

Percentile Range	National % of Students	Percent of Wisc. Students Falling in %-ile Range Read.	Lang.	Math.	Total
Upper (76-99)	25	36	35	48	39
Middle (26-75)	50	53	52	41	50
Lower (1-25)	25	11	13	10	10
	100%	100%	100%	99%	99%

TWELFTH GRADE

Wisconsin seniors score slightly higher than the national averages in reading, language, and mathematics. The scores are at the 54th percentile in mathematics, the 56th percentile in reading, and the 60th percentile in language.

The distribution of scores of Wisconsin twelfth graders compared with the national distribution shows a strong performance. Thirty-one percent of the Wisconsin seniors score in the upper range compared to 25 percent in the national sample. Only 16 percent of Wisconsin seniors fall in the lowest range.

Figure 8
Mean Percentile Scores of Wisconsin Twelfth Grade Students Versus National Average

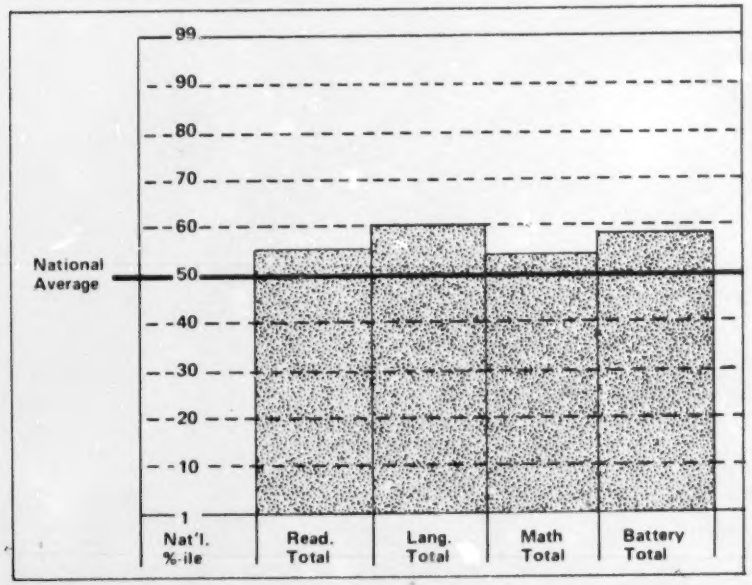


Table 4
Comparison of Wisconsin Twelfth Grade Students With National Norms: Mathematics, Reading, and Language

Percentile Range	National % of Students	Percent of Wisc. Students Falling in %-ile Range			
		Read.	Lang.	Math.	Total
Upper (76-99)	25	27	28	30	31
Middle (26-75)	50	57	54	55	53
Lower (1-25)	25	16	19	16	16
Totals	100%	100%	101%	101%	100%

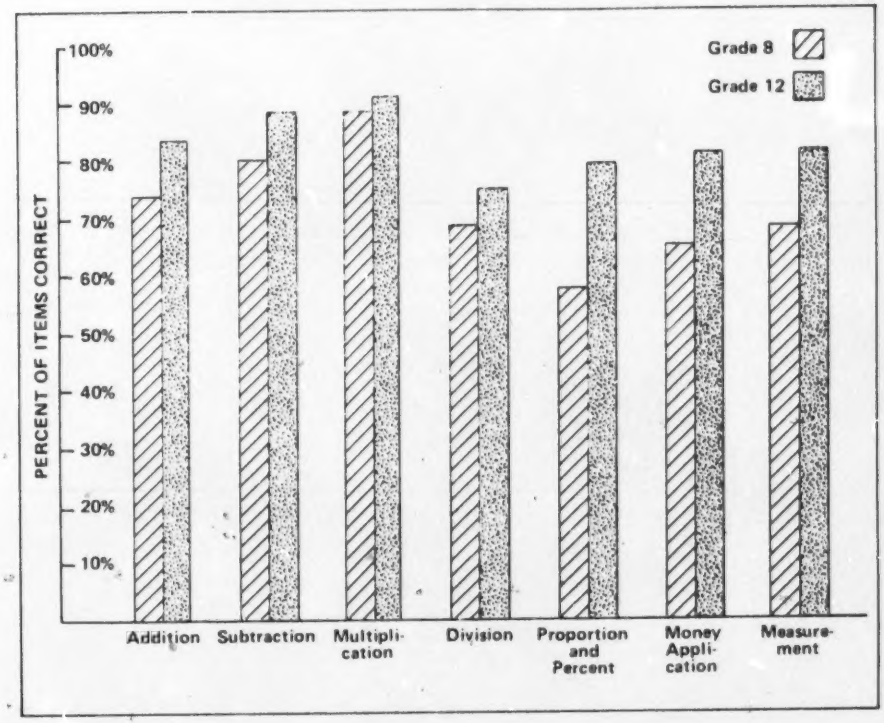
SECTION III

Comparison of Eighth and Twelfth Grade Students on the Objective-Referenced Mathematics Test

The Spring 1977 Wisconsin Pupil Assessment Program administered the identical test to eighth and twelfth grade students. A comparison of scores is shown in Figure 9.

Seniors do better than eighth grade students in all domains. The greatest differences occur in proportion & percent (22 percent) and in the two application areas: money and measurement, where seniors average about 15 percentage points higher tha.i eighth graders.

Figure 9
Comparison of Eighth and Twelfth Grade Students



SECTION IV

Comparison of Results on the 1976 and Spring 1977 State Assessments

One important goal of the Wisconsin Pupil Assessment Program is to analyze and report data over a period of years. Section IV offers a comparison of the 1976 and Spring 1977 results on the objective-referenced mathematics test and the Comprehensive Tests of Basic Skills.

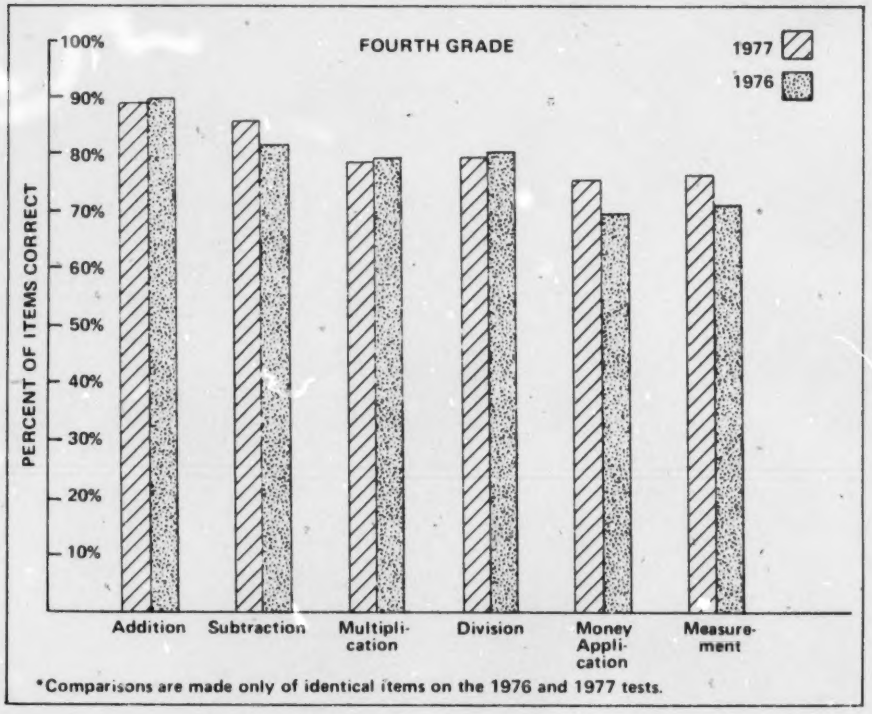
As noted in the Introduction to this report, the data presented in this section are from a two year time period. A longer period is needed to verify trends; at this time all conclusions are tentative.

FOURTH GRADE

Performance of fourth grade students improved between 1976 and 1977 in subtraction and money and measurement applications. Scores in the remaining domains are nearly identical.

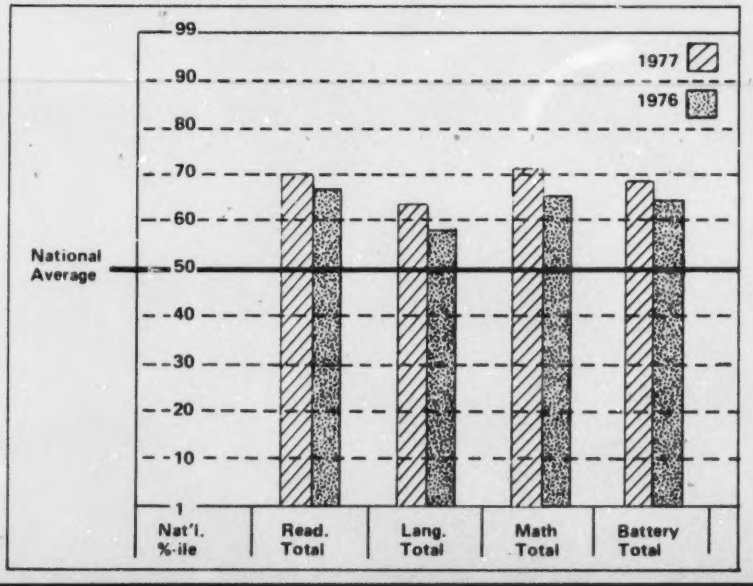
Scores on the Comprehensive Tests of Basic Skills (Figure 11) show an increase between 1976 and 1977. Generally, the increases in the three test areas average about four percentile points.

Figure 10
Comparison of Fourth Graders on the 1976 and 1977 Assessments



*Comparisons are made only of identical items on the 1976 and 1977 tests.

Figure 11
Comparison of Fourth Graders on CTBS: 1976 and Spring 1977

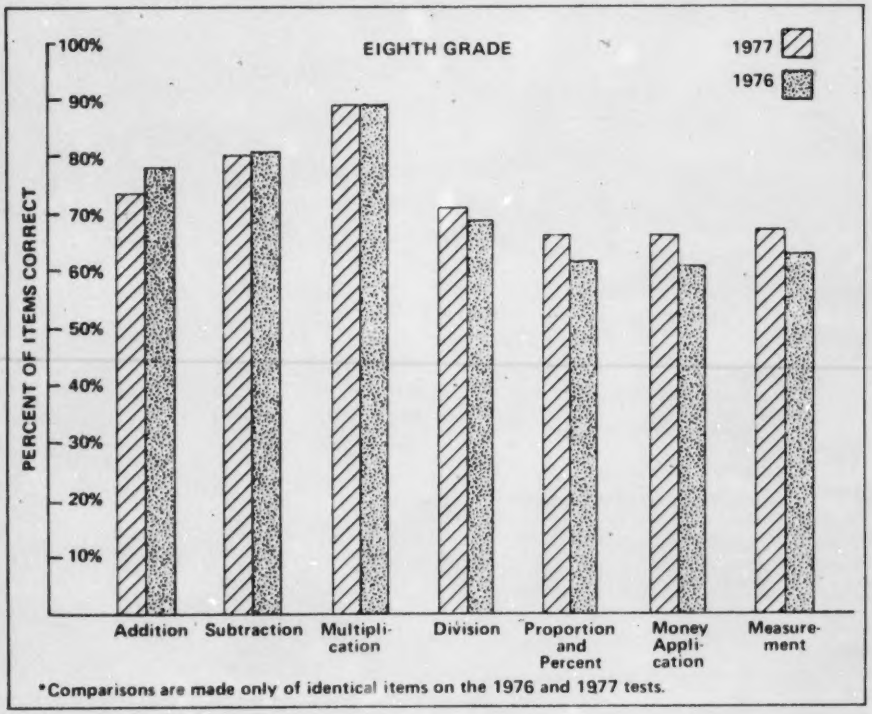


EIGHTH GRADE

Scores on the objective-referenced mathematics test for 1976 and 1977 show little change. There is a slight increase (about four percent) in money and measurement applications and proportion & percent.

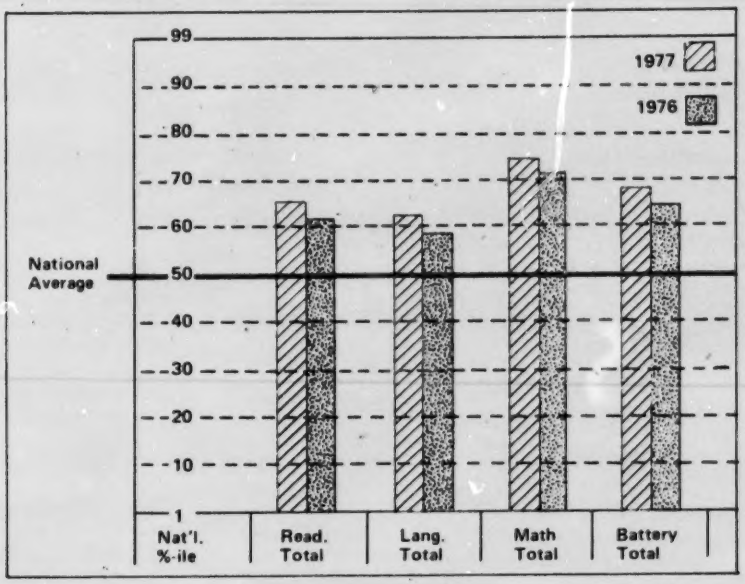
On the Comprehensive Test of Basic Skills there is an increase from 1976 to 1977, averaging about four percentile points.

Figure 12
Comparison of Eighth Graders on the 1976 and 1977 Assessments



*Comparisons are made only of identical items on the 1976 and 1977 tests.

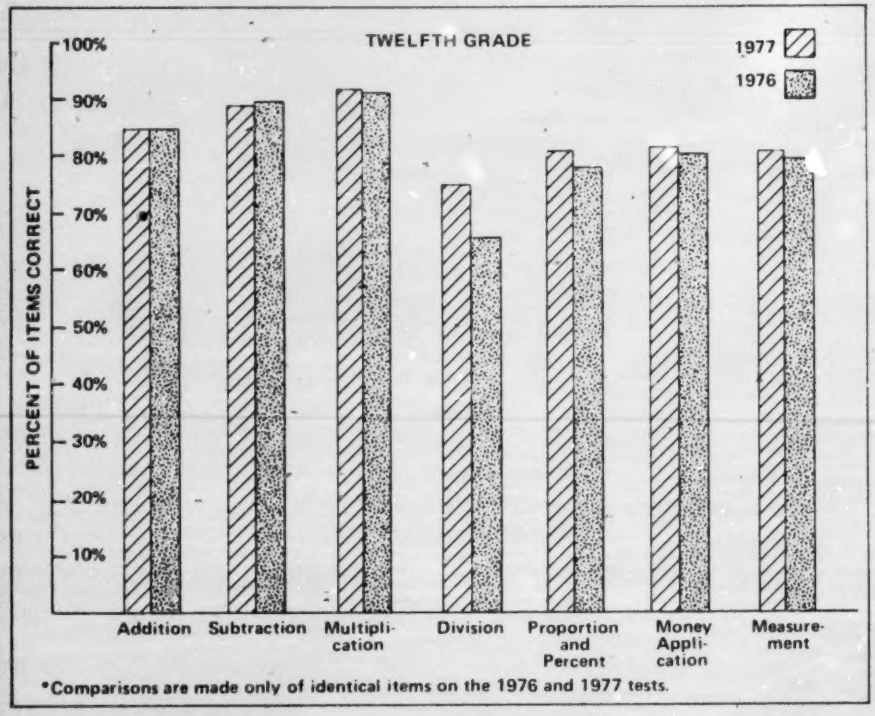
Figure 13
Comparison of Eighth Graders on the CTBS: 1976 and Spring 1977



TWELFTH GRADE

With the exception of division, scores for twelfth grade students on the objective-referenced mathematics test show little change between 1976 and 1977. In division there is an increase of eight percentage points.

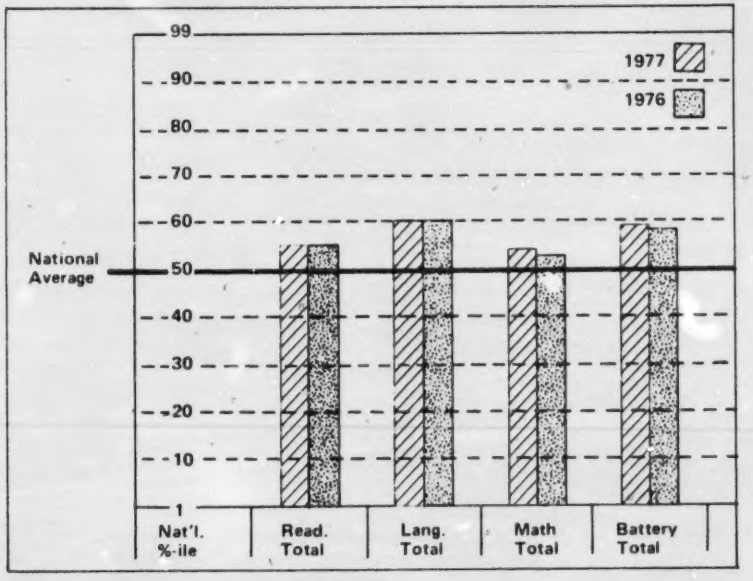
Figure 14
Comparison of Twelfth Graders on the 1976 and 1977 Assessment



*Comparisons are made only of identical items on the 1976 and 1977 tests.

Scores on the Comprehensive Tests of Basic Skills in reading, language, and mathematics are virtually identical for the two years.

Figure 15
Comparison of Twelfth Graders on the CTBS: 1976 and Spring 1977



SECTION V

Comparison of Male and Female Performances on the Objective-Referenced Mathematics Test and the Comprehensive Test of Basic Skills

Section V compares the performances of males and females in mathematics, reading, and language. For each grade level there are two figures: one for the mathematics objective-referenced test and one for the CTBS.

FOURTH GRADE

At the fourth grade level females show higher scores than males in reading, language, and mathematics. The most significant difference is found in language skills (knowledge of grammar, spelling, etc.), where females score 14 percentile points above the males. Females also do better on the objective-referenced mathematics test (Figure 16).

Figure 16
Comparison of Fourth Grade Males and Females
On the Objective-Referenced Mathematics Test

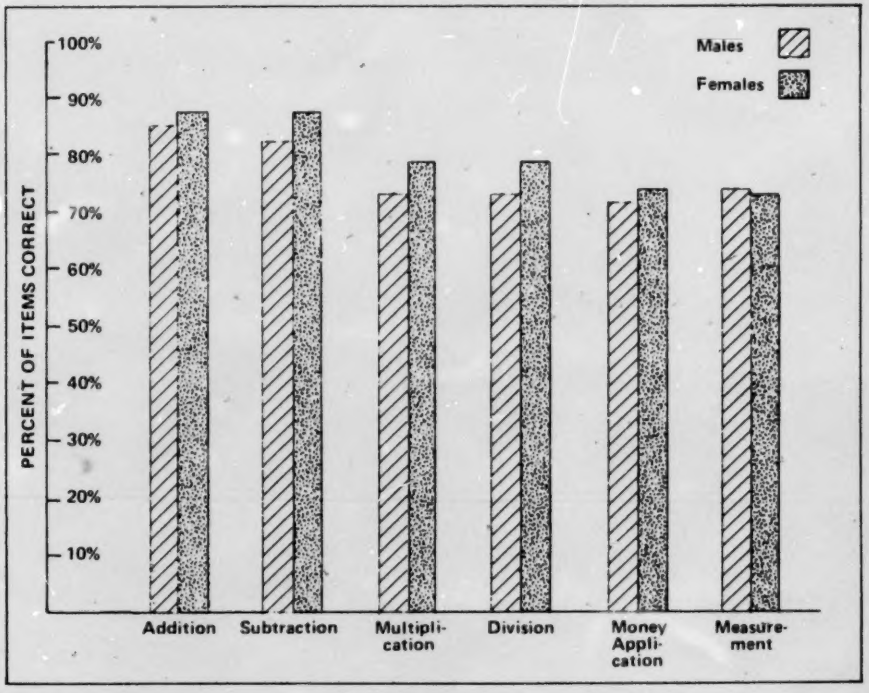
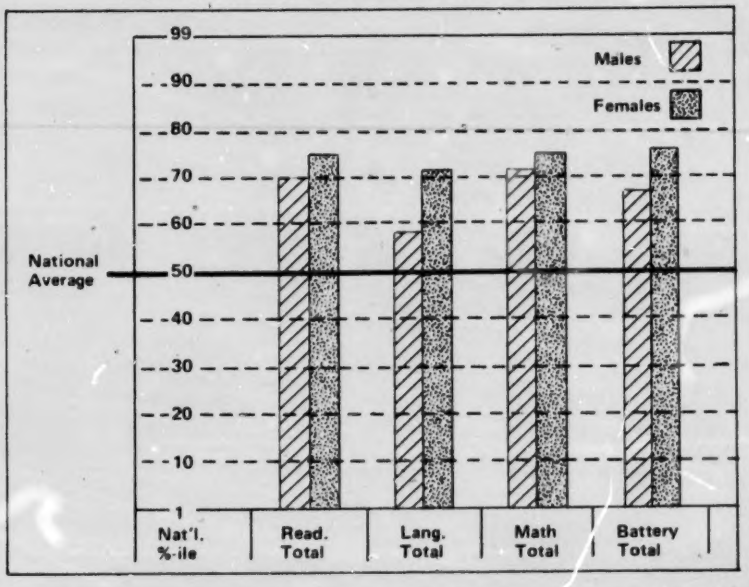


Figure 17
Comparison of Fourth Grade Males and Females on the CTBS



EIGHTH GRADE

Scores at the eighth grade level continue to favor the females. On the objective-referenced mathematics test females do better than males in all the computation domains. In applications the scores are very close, with the males doing slightly better.

The most significant differences are on the reading and language sections of the CTBS. Females score 18 percentile points higher in language and 8 percentile points higher in reading.

Figure 18
Comparison of Eighth Grade Males and Females
On the Objective-Referenced Mathematics Test

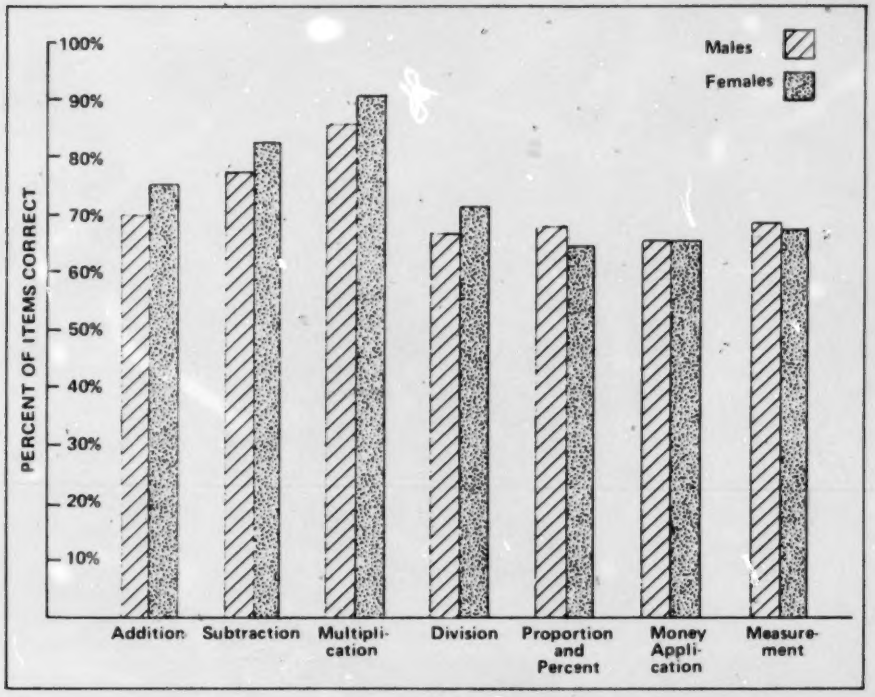
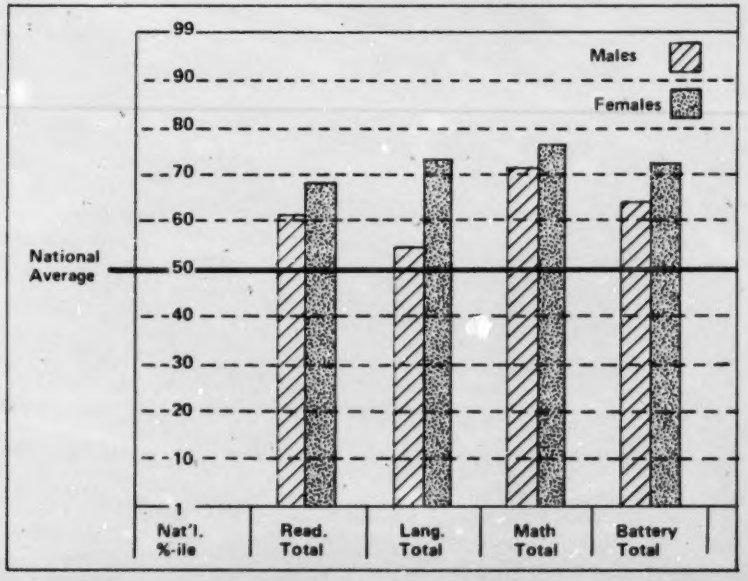


Figure 19
Comparison of Eighth Grade Males and Females on the CTBS



TWELFTH GRADE

Among Wisconsin high school seniors the academic differences between males and females are much smaller than for fourth and eighth grade students. The scores in mathematics (Figure 20) are nearly the same, while in reading both groups score at the 55th percentile on the CTBS (Figure 21).

As in grades four and eight, however, there continues to be a disparity in performance on the language section of the CTBS. Senior females score 12 percentile points above the males.

Figure 20
Comparison of Twelfth Grade Males and Females
On the Objective-Referenced Mathematics Test

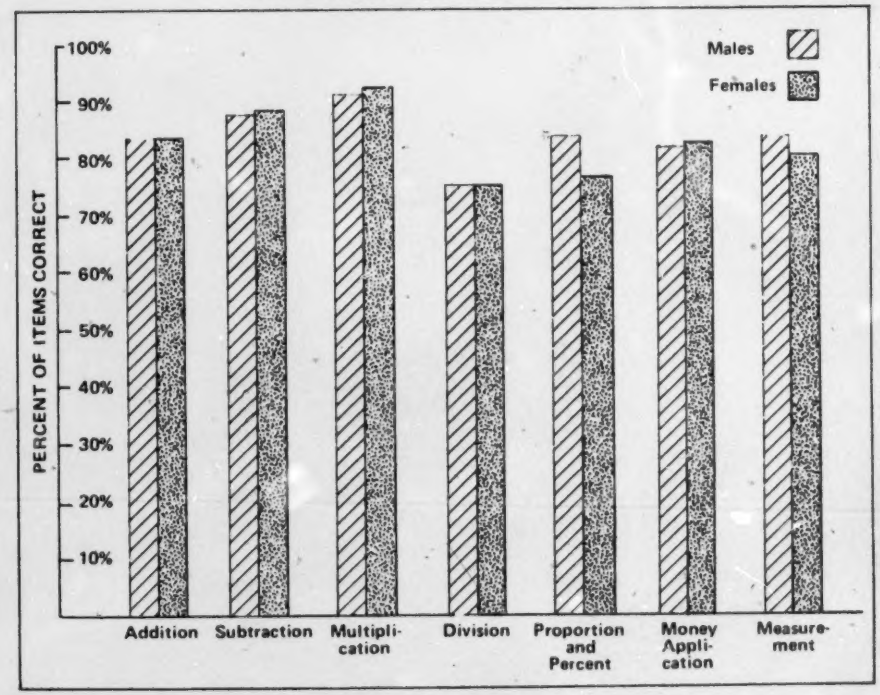
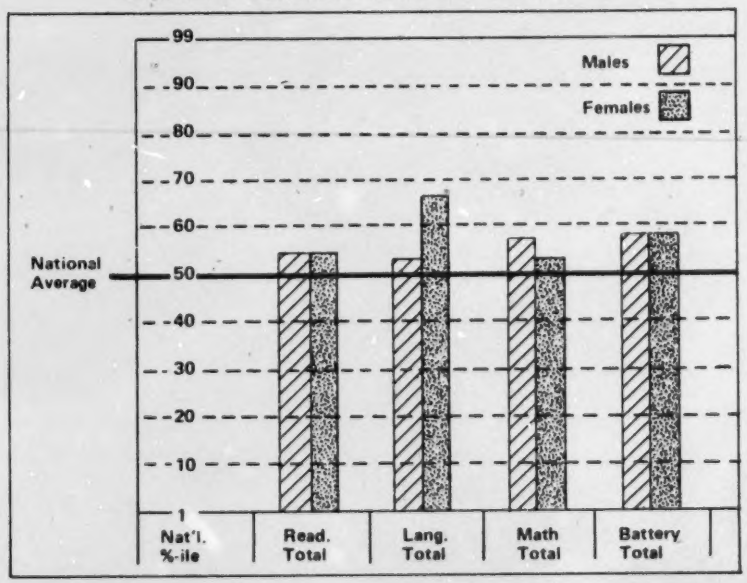


Figure 21
Comparison of Twelfth Grade Males and Females on the CTBS



APPENDIX A

NUMBERS OF STUDENTS PARTICIPATING IN THE SPRING 1977 STATEWIDE ASSESSMENT

	Region of the State				
	NE	NW	SW	SE	TOTALS
FOURTH GRADE					
Computation	353	329	462	626	1770
Applications	331	340	474	587	1732
CTBS	342	240	365	615	1562
TOTALS	1026	909	1301	1828	5064
EIGHTH GRADE					
Computation	345	327	399	450	1521
Applications	404	298	438	514	1654
CTBS	279	358	371	591	1599
TOTALS	1028	983	1208	1555	4774
TWELFTH GRADE					
Computation	385	289	445	705	1824
Applications	327	323	449	701	1800
CTBS	312	310	399	441	1462
TOTALS	1024	922	1293	1847	5086

TOTAL NUMBER OF STUDENTS TESTED IN SPRING 1977 = 14,924

APPENDIX B

MATHEMATICS OBJECTIVES TESTED ON THE OBJECTIVE-REFERENCED TEST, SPRING 1977

COMPUTATION

Addition

- -whole numbers with and without regrouping
- -fractions with like/unlike denominators
- -mixed numerals
- -decimals (terminating)

Subtraction

- -whole numbers with and without regrouping
- -fractions with like/unlike denominators
- -mixed numerals with/without regrouping
- -decimals (terminating)

Multiplication

- -whole numbers with/without regrouping
- -fractions
- -decimals (terminating)

Division

- -whole numbers
- -fractions
- -decimals (terminating)

Proportion & Percent

- -solve a simple proportion
- -compute what percent one whole number is of another
- -compute a given percent of a whole number

APPLICATIONS

Money Applications

- -determine the value of currency/coins
- -find change from a purchase
- -find total possible purchase
- -find total cost
- -find tax, tip or discount
- -find cost after discount or surcharge
- -find or compare unit price(s)
- -find difference in wages or savings (expressed in different units)
- -find travel cost
- -find time, rate or earnings
- -find earnings over time
- -find pay after deductions, raise or overtime
- -balance a checkbook
- -budget living costs

Measurement Applications

- -find total area, length, weight, volume or time
- -find starting, ending or elapsed time
- -use a recipe
- -find average size,units or mph
- -compare temperatures, length, area weight, or volume
- -read a ruler or odometer
- -read maps, charts, graphs
- -use a bus schedule